charts are simple and certain in use, so that calculations formerly entrusted to skilled and responsible computers can now be safely left to the care of a comparatively unskilled subordinate. It is the object of this First Course to offer a clear and elementary account of the construction and use of such charts.

"The method of treatment chosen is based on experience gained in the making of nomograms for various technological departments in the University of Leeds, and in other ways. It is a treatment that should be found useful by the reader who desires to become acquainted both with the theory of nomography and with its practical use. Chapter III begins the nomography proper, but the reader is advised to study Chapters I and II first, in order to see how the nomograms in Chapter III can be constructed. Special attention is directed to §§ 49–50 in Ch. IV, and to Chapter VIII. Answers have been purposely omitted, even where the examples lead to numerical results. . . ."

Contents: List of diagrams and index of nomograms, ix–x; Historical sketch, xi–xii ["When Descartes invented Coördinate Geometry, he put at the disposal of mathematicians a powerful weapon that has led to phenomenal advances in all branches of mathematical science. For the purpose of practical use in calculations by means of graphical representation on a plane, the number of variables that can be used is obviously restricted to two. This limitation was removed by Buache (1752), who introduced the method of contours—now incorporated in all atlases and surveys. By means of contours it is possible to deal with three quantities at once, whilst they are all represented on one plane, as, *e.g.*, in indicating the variation in the height of land or the depth of the sea. This sufficed for a time, but the extraordinary growth of railway systems all over the world led to important developments by Lalanne (1841), Massau (1884), and Lallemand (1886).

"The idea of using collinear points, which constitutes the chief beauty of the method of the present book, was developed by d'Ocagne (1884). It was d'Ocagne, too, who applied the name Nomography to this method, in his book *Les calculs usuels effectués au moyen des abaques* (1891). Since then further extensions have been made by d'Ocagne and others.

"In recent years the utility and convenience of nomography have been increasingly realized, and the subject has gained in importance and recognition, particularly in engineering practice. It is, in the main, a product of French mathematical genius. Articles have appeared in one or two English journals, and excellent accounts of the subject in English are to be found in Hezlett's (*sic*) *Nomography* (Royal Military Institution, Woolwich) and Lipka's *Graphical and Mechanical Computation* (Wiley, New York).

"But the reader who is interested in the subject cannot do better than read d'Ocagne's excellent *Traité de Nomographie* (G. Villars, Paris, 1899)"]; Introduction, 1–5; Chapter I: Nomograms for addition and simultaneous equations, 6–22; II: Generalized nomograms for addition and subtraction, 23–45; III: Nomograms for multiplication and division, 46–64; IV: Nomogram with two parallel scales. Quadratic equations, etc., 65–88; V: Generalized theory of nomograms with two parallel scales. Parallel coordinates, 89–99; VI: Nomograms with trigonometrical functions, 100–108; VII: Nomograms with intersecting scales, 109–117; VII: Practical and automatic construction of nomograms. Empirical nomograms. Practical details, 118–135.

Leçons sur l'intégration des équations aux dérivées partielles du premier ordre. Par EDOUARD GOURSAT. Deuxième édition revue et augmentée. Paris, Hermann, 1921 [published October, 1920]. 2 + 459 pages. Price 40 francs.

The first edition of this work appeared in 1891. In the present edition considerable change has taken place and the work as a whole is nearly one third larger. Goursat remarks in the preface:

"Dans cette nouvelle édition, on a conservé le plan général de ces Leçons. Seuls les premiers Chapitres, relatifs aux théorèmes d'existence et aux équations linéaires, ont été assez profondément remaniés. Dans la suite, on a simplement modifié quelques demonstrations et complété certains résultats.

C'est aussi pour ne pas bouleverser l'ordre suivi dans l'édition originale que je n'ai pas introduit dans ce Volume la méthode de Pfaff. Cette importante méthode sera exposée, avec les développements qu'elle mérite, dans un autre Ouvrage, spécialement consacré au *Problème de Pfaff* et à ses généralisations, et qui paraîtra, je l'espère, prochainement." The publisher expects that this new volume will be ready in September, 1921.

Contents—Chapter I: Théorèmes d'existence, 1–49; II: Equations linéaires, Systèmes complets, 50–102; III: Equations linéaires aux différentielles totales, 103–133; IV: Intégrals complètes. Méthode de LaGrange et Charpit, 134–161; V: Méthode de Cauchy. Caractéristiques, 162–201; VI: Etude géométrique des équations a trois variables. Courbes intégrales. Solutions singulières, 202–253; VII: Première méthode de Jacobi, 254–266; VIII: Seconde méthode de Jacobi. Généralisations de Mayer et de Lie, 267–308; IX: Théorie générale de Lie, 309–352; X: Transformations de contact, 353–409; XI: Groupes de fonctions. Méthode générale d'intégration, 410–454.

Pioneers of Progress: *Archimedes*. By T. L. HEATH. ("Men of Science" series edited by S. Chapman). London, Society for Promoting Christian Knowledge, 1920. 2 + 58 pages. Cloth. Price 2 shillings.

First two paragraphs: "If the ordinary person were asked to say off-hand what he knew of Archimedes, he would probably, at the most, be able to quote one or other of the well-known stories about him: how, after discovering the solution of some problem in the bath, he was so overjoyed that he ran naked to his house, shouting εὕρηκα, εὕρηκα (or, as we might say, 'I've got it, I've got it'); or how he said 'Give me a place to stand on and I will move the earth'; or again how he was killed, at the capture of Syracuse in the Second Punic War, by a Roman soldier who resented being told to get away from a diagram drawn on the ground which he was studying.

"And it is to be feared that few who are not experts in the history of mathematics have any acquaintance with the details of the original discoveries in mathematics of the greatest mathematician of antiquity, perhaps the greatest mathematical genius that the world has ever seen."

Contents—Chapter I: Archimedes, 1–6; II: Greek geometry to Archimedes, 7–23; III: The works of Archimedes, 24–28; IV: Geometry in Archimedes, 29–44; V: The sandreckoner, 45–49; VI: Mechanics, 50–52; VII: Hydrostatics, 53–56; Bibliography, 57; Chronology, 58.

An Introduction to String Figures. An Amusement for Everybody. By W. W. R. BALL. Cambridge, W. Heffer & Sons, 1920. 38 pages. Price 2 shillings.

"Prefatory Note" dated July, 1920: "The making of String Figures is a game common among primitive people. Its study by men of science is a recent development, their researches have, however, already justified its description as a hobby, fascinating to most people and readily mastered. The following pages contain a lecture on these figures and their history; to it I have appended full directions for the construction of several easy typical designs, arranged roughly in order of difficulty, and, for those who wish to go further, lists of additional patterns and references. The only expense necessary to anyone who takes up the pastime is the acquisition of a piece of good string some seven feet long; with that and this booklet to aid him, he will have at his command an amusement that may while away many a vacant hour."

Newton. (Profile N. 52). By GINO LORIA, Roma, A. F. Formiggini, 1920. 69 pages. Price 3.00 lire.

This is the latest volume in the dainty little series of booklets (4 x 6½ inches) among which A. Mieli's *Lavoisier* (no. 42), A. Favaro's *Archimedes* (no. 21), and *Galileo* (no. 10) have been published during the past ten years. Each volume is written with light touch by one thoroughly conversant with materials regarding the life of the subject, and an ample bibliography provides finger-posts directing the inquirer to more searching investigations. Most of the volumes of the series have a portrait frontispiece. In preparing his little volume Professor Loria discovered a discussion of Newton's laws in an eighteenth century manuscript which he described and reprinted in "Per la storia del newtonianismo in Italia," *Atti della Società italiana del Progresso delle Scienze*, Pisa, April, 1919, Rome, 1920.